

ATOMIC ENERGY

ROBERT M. SHERMAN, EDITOR. PUBLISHED BI-WEEKLY BY ATOMIC ENERGY NEWS, INC., 509 FIFTH AVENUE, NEW YORK 17, N. Y.

Dear Sir:

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The two uranium-235 separation plants, now being built at Oak Ridge by Carbide and Carbon Chemicals Division, will also be operated by Carbide. Contracts are now being negotiated by the U. S. Atomic Energy Commission, with Carbide, for operation of these facilities: the \$67 million K-29 unit, and the \$162 million K-31 unit. Contracts will be similar to those under which Carbide now operates, at Oak Ridge, the K-25 and K-27 uranium-235 separation plants, parts of the Y-12 electromagnetic plant, and the National Laboratory (AEN 3/14/50, p.2.) (The cost-plus-fixed-fee building contract, under which Carbide is building K-29 and K-31, was recently criticized by Congress. It was pointed out that competitive bidding can result in lower costs than fixed-fee methods. The AEC claimed urgency; that security clearances, the necessary prelude to competitive bidding, would cause delays.)

Progress on the prototype nuclear reactor for submarine propulsion is "sufficiently promising" to warrant going ahead with hull designs and construction, Admiral Forrest P. Sherman, Chief of Naval Operations, told a House Armed Services Committee in Washington, last week. He said the Navy Department believes such a craft could be in operation three years after funds are allocated for it. Preliminary investigations on such an undersea craft are under way by such firms as the Electric Boat Co., of Groton, Conn., leading submarine builder.

Tritium (hydrogen-3) as a basic component of thermonuclear weapons (as the hydrogen bomb) is too costly, William D. Harkins, University of Chicago, recently told the National Academy of Sciences in Washington. He was discussing relations discovered by himself and Wilson concerning the efficiencies of such weapons. Ordinary hydrogen would give the greatest energy, if it could be converted completely into helium-4, but presumably (he said) this requires a series of reactions, and is too slow. Deuterium (hydrogen-2) will be employed, Harkins stated, although the energy from the reaction (4 Mev) is only about one-third that given by tritium (11.4 Mev). He noted that lithium deuteride, or tritide, would reduce the volume employed.

Twelve new contracts in physical research, totaling \$1,345,600.00, were awarded by the AEC during the first 3 months of this year; this brings to 67 the total of such unclassified projects at university and industrial laboratories now supported by the AEC. Information on how to submit formal proposals for AEC support of research projects in the physical sciences may be obtained from the Division of Research, USAEC, Washington 25, D. C.

A curriculum in Nuclear Engineering, which includes a full undergraduate course of study, and a master's degree program, will be opened to prospective students in the Fall term of this year at North Carolina State College, University of N.C., Raleigh. This is believed to be the first full course of study in Nuclear Engineering available in an established educational institution.

AT THE ATOMIC CITIES AND CENTERS IN THE UNITED STATES...

RICHLAND, Washington- Conversion to an improved method of metallurgical control, in uranium slug fabrication, at Hanford Plutonium Works here, will involve the purchase and installation of new type equipment for production processing of uranium slugs during the canning operation. Approximately \$160,000.00 will be spent in fiscal 1951 for the equipment. (The increased demand for uranium metal, under the accelerated plutonium production schedules at Hanford, will put into practically 100% use the railroad cask cars used to transport uranium metal to Hanford, from Oak Ridge and other centers. This increased use, and the 5 years service they have already seen, will now mean additional maintenance, and require the purchase of another of these specially designed cars.)

An approximately half-million dollars will be spent in the 1950 and 1951 fiscal years on equipment for the laboratories in the Technical and Health Instruments Divisions, at Hanford Works. Expenditures will be for such items as laboratory and clinical centrifuges, strip heaters and rheostats, electrolytic equipment, microscopes, physics equipment, instrument testing devices, etc.

Now up to schedule is the multi-million dollar physical plant expansion of Hanford Works, on which Atkinson-Jones Construction Co. holds the contract for the major construction work (AEN 1/3/50, p. 2.). Evidence of the increased tempo of operations are the over 2,500 construction workers who have been put on the payrolls of A-J, and its sub-contractors, since the first of the year.

Here, as at Oak Ridge (below), the possibility of incorporating the town and allowing private ownership of property, has assumed some urgency, mainly as a result of Congressional prodding from the powerful House Appropriations Committee. A Chicago firm, Public Administration Services, is now under contract to make recommendations on financing private purchases of Government land; tax rates; protection of residents from speculation; and other facets of municipal operation.

OAK RIDGE, Tennessee- Projects at the K-25 uranium-235 plant here, which are under consideration for future investigations, are the provision of gas test loop equipment for evaluation of new compressor and diffuser designs (a \$75,000.00 job), equipment to investigate dynamic corrosion resistance of cascade and barrier materials (for which \$50,000.00 will be spent), and furnace stands for consumption and accountability studies (a \$50,000.00 project.)

Construction of homes here, to be offered for sale or rent, by private building firms, and also the construction of homes by individuals for their own use, on land leased by the Government on a long-term basis, is now under consideration here. Also in the early planning stage is the sale of commercial buildings with long-term ground leases. (Now, all Oak Ridge units are rented.) (About a year ago, the J. L. Jacobs Co., of Chicago, under an AEC-contract, analysed the ability of Oak Ridge to become an incorporated community. Among other things, it was found that the Federal subsidy that would be needed to "make the town go" would be too high, and incorporation was postponed.)

The Oak Ridge School of Reactor Technology here is now accepting applications for its course to begin early in September, 1950. Fifty students will be accepted--30 from industry and government, and 20 from the ranks of recent college graduates. Applications, which should be made before June 1st, should be sent to the school at P. O. Box P, here at Oak Ridge.

For construction of the telecobalt therapy building at the Oak Ridge Hospital here, bid inv. number 401-50-13A has now been issued by the AEC at Oak Ridge; closing date is May 22nd.

SANDIA BASE, Albuquerque, New Mexico- The expanded atomic weapons manufacturing program will see an enlargement of production facilities, both here and among AEC industrial contractors, for the various types of atomic weapons which are assembled and stored, here and in the immediate vicinity. Weapon output, however, is dependent upon supplies of plutonium. Plutonium production is only now in the process of being increased. The ten new projects, which comprise this weapons expansion, must, therefore, follow along in point of time behind the plutonium production facilities. It will, therefore, be 1951 before this weapons increase comes into being.

NEW PRODUCTS, PROCESSES & INSTRUMENTS...for nuclear work...

FROM THE MANUFACTURERS- New high intensity pocket ionization chamber, Model 506, for measurement of radiation in the range of 100 r. Tamper proof; cannot be discharged except by the special charger-reader. Provides accurate measurement even with short exposure, it is said. Wide energy response, from 40 KV and up. Yields high dosage, with overdose not affecting performance. --Victoreen Instrument Co., Cleveland, Ohio.

Improved counting rate meter, Model 1500-B, for continuously monitoring radioactive materials. Range: 5 to 20,000 counts per minute, with full scale values of 200; 600; 2,000; 6,000; and 20,000. Quenching circuit operates with self-quenching or non-self-quenching counter tubes. Counting rate meter sensitivity said to be increased 4-fold; now responds to $\frac{1}{2}$ -volt pulses.--General Radio Co., Cambridge 39, Mass.

PROPOSALS to furnish two periscopes for a "hot" laboratory have been asked by the Chemical Corps Procurement Agency, Army Chemical Center, Md., under bid invitation no. 511; bids are due May 11th, 1950.

EXPERIMENTS with CdS as an x-ray detector, as against the photo-multiplier x-ray detector, have shown that, in sensitivity, the CdS crystal can be compared directly with the photo-multiplier tube, according to R. Frerichs, who made the U. S. Navy-sponsored investigations at Northwestern University, Evanston, Ill. The CdS crystal did have the disadvantage that its response to x-ray pulses was apparently slower, with the current reaching a final value only after long irradiation. However, the CdS crystals did not show the fatigue results observed with multiplier tubes.

THE CHOICE OF LABORATORY EQUIPMENT for work with radioactive materials was described to the Division of Paint, Varnish and Plastics Chemistry at the recent American Chemical Society meeting in Detroit. While cost and corrosion resistance should, of course, be considered, in making such a choice, the susceptibility of the surfaces to radioactive contamination, and the ease of subsequent decontamination, are no less important, O. M. Bizzell, of the AEC stated. To be suitable, materials should be smooth and non-porous, nonionic, corrosion resistant in the standard sense, and heat resistant. Polished stainless-steel, and heat-resistant glass most nearly approach the ideal, Dr. Bizzell said. Vinyl coatings for practical protection against permanent contamination, wherever spillage of radioactive materials is possible, were recommended by C. D. Watson, also of the AEC.

This Detroit meeting (above) also heard M/G. A. C. McAuliffe tell of the three separate research and development programs, in the field of atomic energy, now underway by the Chemical Corps. They involve development of, (1) chemical means of detecting and measuring radiation, (2) decontaminating procedures in the event of atomic weapon attacks, and (3) individual and collective protective methods against atomic weapon attacks.

BOOKS & OTHER PUBLICATIONS... in the nuclear field...

Atomic Age. Collection of the Sir Halley Stewart Lectures, London, in 1948. Bertrand Russell, Lionel Curtis, M. L. Oliphant, P.M.S. Blackett, and other specialists, give their views on the military, economic, moral, and political aspects of atomic energy. 149 pages.--Macmillan Co., N. Y. 11. (\$2.50)

Clinical Use of Radioactive Isotopes, by B. V. A. Low Beer, M. D., Div. of Radiology, University of California School of Medicine. Covers radioactivity detection and measurement; radioactivity units and standards; safeguards in use of radioisotopes, etc. 365 pages, 105 illus.--Charles C. Thomas, Publisher, Springfield, Ill. (approx. \$6.50)

Nuclides. Wall chart and explanatory booklet, on nuclides, prepared at the Knolls Atomic Power Laboratory, by General Electric Co. A revision of isotope chart originally issued in 1948. Available to interested individuals on request. --General Electric Co., Schenectady 5, N. Y.

Production Allocation Manual. Guide for industrial contractors in producing war materiel for Atomic Energy Commission, Army, Navy, Maritime Commission, etc. Issued by Munitions Board.--Superintendent of Documents, Wash. 25, D. C. (45¢)

RAW MATERIALS...radioactive ores and other essentials for nuclear work...

UNITED STATES - A joint Canadian-United States conference on uranium mineralogy brought together in New York last week members of Government research groups (Bureau of Mines, Geological Survey, etc.) of the two countries who are doing basic investigations of uranium minerals, particularly those occurring in high-grade deposits. It is the first of a series aimed at coordinating the uranium mineralogy research of the two countries.

CANADA - Extension to Mar. 31st, 1958, of the Government-guaranteed period for the minimum price it will pay for uranium ores and concentrates, and a new pricing formula under which the Government purchases such ores, mark latest moves of Canada to encourage uranium mining. Under the new price arrangements, the price per pound that will be paid for the uranium oxide content of acceptable concentrates containing 10% or more by weight of uranium oxide is obtained by: (1) Multiplying the average number of pounds of uranium oxide per ton of mill feed by \$2.75 a pound, (2) Adding to this a milling allowance of \$7.25 per ton of ore milled, and (3) Dividing the sum of the two by 70% of the average number of pounds of uranium oxide per ton of mill feed. Thus, for an orebody which averages 2% uranium oxide (about the largest yield from Canadian ores), the price paid for uranium oxide will be about \$4.00 per pound; for an average grade of 0.25%, the price paid per pound will be about \$6.00. This formula will, it is believed, encourage the development of low-grade orebodies.

GREAT BRITAIN - The British Government has agreed to sell its holdings in African uranium and copper mines with a view to the resale of some of the shares to a United States group, Sir Stafford Cripps, Chancellor of the Exchequer, told the House of Commons in London last week. He said the Bank of England, on behalf of the British government, has accepted the offer of an Anglo-Belgian mining group to buy the Government's holdings of 1,667,961 shares of ordinary stock of Tanganyika Concessions, Ltd. (Purchase price would be 20 shilling for 1,500,000 shares, and 24 shillings each for the remainder. This is more than their value when they were acquired in 1946 by the British government from the French government in settlement of certain debts that were due.) Tanganyika Concessions has a large interest in the Union Miniere du Haut-Katanga, which operates the Shinkolobwe pitchblende pits of the Belgian Congo, main source of the U.S.'s uranium metal. Furthermore, Tanganyika Concessions controls the Benguela Railway, over which products of the mines are hauled to the Atlantic coast of Africa. The Chancellor said only minority control would be permitted to change hands, with only 750,000 shares offered to the United States syndicate. Lazard Freres, of New York, are co-managers with Ladenburg, Thalmann and Co. of the syndicate.

ATOMIC PATENT DIGEST...latest U.S. & British applications & grants...

Method of logging a borehole traversing sub-surface formations. A source of gamma-rays, capable of penetrating the formation, is passed through the hole, in order to induce neutrons from it. Measurements are made of the variation in the intensity of the induced neutrons reaching the hole from the formation. U. S. Pat. No. 2,504,888, issued Apr. 18th, 1950; assigned to Texaco Development Corp., N.Y.

Fog detector for x-ray film packages. A visible-light excluding packet, pervious to the normally invisible radiation, is positioned to absorb radiation which might enter an x-ray film package. The packet contains a film sensitive to both the normally invisible radiation, and light from the visible spectrum. A coating of fluorescent material is adjacent the film emulsion and so placed that, upon its fluorescing, it exposes the emulsion, to visible light. (The fluorescence is induced by the invisible radiation.) U. S. Pat. No. 2,505,346, issued Apr. 25th, 1950; assigned to General Aniline & Film Corp., N.Y.

Proportional radiation counter comprising a tubular cathode, a rod-like conducting member insulatingly supported axially of the cathode, and an anode consisting of a loop of wire mounted on the end of the rod-like member. Means are provided for moving the rod-like member longitudinally, so as to change the spacing between the cathode and the anode. U. S. Pat. No. 2,505,919, issued May 2nd, 1950, to J. A. Simpson, Jr.; assigned to U. S. A. (USAEGB).

RADIOISOTOPES...as used for therapy & tracer applications...

The behaviour of Hg-203,205; Cl-36; Na-22; Na-24; K-42; P-32; and I-131, in water, human urine, and human plasma, in vitro and in vivo, has been investigated, by F. J. Kelly, C. T. Ray, S. A. Threefoot, and G. E. Burch, of the Dept. of Medicine, Tulane University, and the Charity Hospital, Louisiana. They observed that although the factors of self-absorption, volatilization, and deliquescence (which offer special problems in radiobiology) behave exactly as would be indicated, they may be overlooked because of the peculiar experimental conditions encountered in biological investigations. After correlating the gravimetric and radiometric determinations, of preparations of these isotopes (in water, urine and plasma), they found that to control these factors, careful attention should be paid to the chemical environment, and, more important, the method and temperature of drying the biologic materials for counting.

The distribution of iodine-131 in the tissues of 14 subjects injected intravenously with varying quantities of radioactively labeled sodium iodide (and who came to autopsy), has been investigated by R. E. Goldsmith, C. D. Stevens, and L. Schiff, of the Gastric Laboratory, Dep't. of Internal Medicine, University of Cincinnati College of Medicine, and the Cincinnati General Hospital. The subjects had died from 3 to 159 hours after the administration of the radioiodine. In the findings, the thyroid gland contained much higher concentrations of I-131 than did the blood serum, while stomach tissues from 10 of the 13 subjects sampled contained two or more times the concentration of I-131 than was present in the blood serum. None of the other nine tissues examined showed similar ability to concentrate the I-131.

IONIZING RADIATION...investigations & notes...

Blood from a normal human donor was exposed, in vitro, to x-irradiation, in doses ranging from $10\frac{1}{2}$ to 20,000 roentgens, in observations made of the effect on blood of such irradiation, by R. W. Davis, N. Dole, M. J. Izzo, and L. E. Young, of the Dep'ts. of Pediatrics and Medicine, University of Rochester School of Medicine & Dentistry, Rochester, N.Y. The osmotic and mechanical fragility of the red cells was normal, when tested immediately after radiation, and again after incubation at 37-degrees C. for 24-hours following exposure. An exception were the samples treated with 20,000 r, which showed slightly greater than normal increase in osmotic fragility after incubation. Rates of autohemolysis during incubation in vitro were neither accelerated nor decelerated by radiation of the blood prior to incubation.

In tests conducted at the University of Illinois, the efficiency of 20 Mev roentgen rays produced by the betatron has been compared with that of conventional roentgen rays at different dose levels. In the experimental work, H. Quastler and E. F. Lanzl, of the University's Dep't. of Physics, and the Carle Foundation, Urbana, Ill., used as a test reaction the lethal effect of divided doses on mice. They found that at a dosage level which causes death after about one week of daily treatments, high energy rays are about as efficient as in the massive dose test (of conventional roentgen rays), while at a dosage level which causes death after about three weeks of daily treatment, their efficiency is significantly lowered.

The stunting of plant seedlings by irradiation was described, also by H. Quastler (above), at the recent Atlantic City meeting of the American Association for Cancer Research. The seedlings had been irradiated under widely differing conditions. While it was not possible to identify the processes involved in this radiation-induced stunting, some information was obtained from an analysis of their responses under the differing conditions of the experiment. The effect, it was found, involves not growth completed at the time of irradiation, but only the growth expectancy. It is the preparatory stages, of the growth process, which are the ones most susceptible to radiation, Quastler stated. He found the radiation effect on mitosis to be irrelevant, in his material.

Sincerely,

The Staff,
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